

**You are at station A on the Orange lab bench**

**First, you will do activities 1, 2, 3 and 4 here.**

**Then, you will do activity 5 at station B**

**After that, you will do activity 6 at station C**

**Lastly, you will do activities 7,8,9, and 10 at station D**

**You are at station B on the Orange lab bench**

**First, you will do activities 1, 2, 3 and 5 here**

**Then, you will do activity 6 at station C**

**After that, you will do activity 7 at station D**

**Lastly, you will do activities 4, 8, 9 and 10 at station A**

**You are at station C on the Orange lab bench**

**First, you will do activities 1, 2, 3 and 6 here**

**Then you will do activity 7 at station D**

**After that, you will do activity 4 at station A**

**Lastly, you will do activities 5, 8, 9 and 10 at station B**

**You are at station D on the Orange lab bench**

**First, you will do activities 1, 2, 3 and 7 here**

**Then, you will do activity 4 at station A**

**After that, you will do activity 5 at station B**

**Lastly, you will do activities 6, 8, 9 and 10 at station C**

**You are at station A on the Green lab bench**  
**First, you will do activities 1, 2, 3 and 4 here.**  
**Then, you will do activity 5 at station B**  
**After that, you will do activity 6 at station C**  
**Lastly, you will do activities 7,8,9, and 10 at station D**

**You are at station B on the Green lab bench**  
**First, you will do activities 1, 2, 3 and 5 here**  
**Then, you will do activity 6 at station C**  
**After that, you will do activity 7 at station D**  
**Lastly, you will do activities 4, 8, 9 and 10 at station A**

**You are at station C on the Green lab bench**  
**First, you will do activities 1, 2, 3 and 6 here**  
**Then you will do activity 7 at station D**  
**After that, you will do activity 4 at station A**  
**Lastly, you will do activities 5, 8, 9 and 10 at station B**

**You are at station D on the Green lab bench**  
**First, you will do activities 1, 2, 3 and 7 here**  
**Then, you will do activity 4 at station A**  
**After that, you will do activity 5 at station B**  
**Lastly, you will do activities 6, 8, 9 and 10 at station C**

**You are at station A on the Red lab bench**  
**First, you will do activities 1, 2, 3 and 4 here.**  
**Then, you will do activity 5 at station B**  
**After that, you will do activity 6 at station C**  
**Lastly, you will do activities 7,8,9, and 10 at station D**

**You are at station B on the Red lab bench**  
**First, you will do activities 1, 2, 3 and 5 here**  
**Then, you will do activity 6 at station C**  
**After that, you will do activity 7 at station D**  
**Lastly, you will do activities 4, 8, 9 and 10 at station A**

**You are at station C on the Red lab bench**  
**First, you will do activities 1, 2, 3 and 6 here**  
**Then you will do activity 7 at station D**  
**After that, you will do activity 4 at station A**  
**Lastly, you will do activities 5, 8, 9 and 10 at station B**

**You are at station D on the Red lab bench**  
**First, you will do activities 1, 2, 3 and 7 here**  
**Then, you will do activity 4 at station A**  
**After that, you will do activity 5 at station B**  
**Lastly, you will do activities 6, 8, 9 and 10 at station C**

**You are at station A on the Blue lab bench  
First, you will do activities 1, 2, 3 and 4 here.**

**Then, you will do activity 5 at station B**

**After that, you will do activity 6 at station C**

**Lastly, you will do activities 7,8,9, and 10 at station D**

**You are at station B on the Blue lab bench**

**First, you will do activities 1, 2, 3 and 5 here**

**Then, you will do activity 6 at station C**

**After that, you will do activity 7 at station D**

**Lastly, you will do activities 4, 8, 9 and 10 at station A**

**You are at station C on the Blue bench**

**First, you will do activities 1, 2, 3 and 6 here**

**Then you will do activity 7 at station D**

**After that, you will do activity 4 at station A**

**Lastly, you will do activities 5, 8, 9 and 10 at station B**

**You are at station D on the Blue lab bench**

**First, you will do activities 1, 2, 3 and 7 here**

**Then, you will do activity 4 at station A**

**After that, you will do activity 5 at station B**

**Lastly, you will do activities 6, 8, 9 and 10 at station C**

You are at station A on the Purple lab bench  
First, you will do activities 1, 2, 3 and 4 here.  
Then, you will do activity 5 at station B  
After that, you will do activity 6 at station C  
Lastly, you will do activities 7,8,9, and 10 at station D

You are at station B on the Purple lab bench  
First, you will do activities 1, 2, 3 and 5 here  
Then, you will do activity 6 at station C  
After that, you will do activity 7 at station D  
Lastly, you will do activities 4, 8, 9 and 10 at station A

You are at station C on the Purple lab bench  
First, you will do activities 1, 2, 3 and 6 here  
Then you will do activity 7 at station D  
After that, you will do activity 4 at station A  
Lastly, you will do activities 5, 8, 9 and 10 at station B

You are at station D on the Purple lab bench  
First, you will do activities 1, 2, 3 and 7 here  
Then, you will do activity 4 at station A  
After that, you will do activity 5 at station B  
Lastly, you will do activities 6, 8, 9 and 10 at station C

# Food Science

## National Competition 2013

### Instructions

Read this before you even think of starting!



- At two stations you will be doing multiple activities. Stations at which you have multiple activities should be noted on your entry card.
- Put your name, your partner's name, team name, and team number on every page.
- You have been assigned a starting point at a particular lab bench. Each lab bench has a color. Do not go to a lab bench of a different color than where you start.
- All answers must be written legibly on your answer sheet. If I can't read it, I can't grade it.
- Spelling only counts if it makes a difference in the answer. (ie phospholipid spelled phospholippid isn't a problem, but sucrose spelled glucose is a problem. )
- At stations where you have multiple activities, you may work on anything labeled "available" at that station during the time allotted. You must budget your time per activity at that station. You need to finish the activities within the time limit.
- If something is labeled "available only when instructed" don't touch it until instructed.
- Time intervals will be announced to keep you on track.
- Goggles are required for all stations except 8, 9 and 10. Failure to wear goggles may result in penalty
- Clean up all messes quickly and leave stations just like you found them.
- Do not take any items to the next station! Taking items to the next station may result in a penalty.
- You may take the test apart only if you can put it back together again in order!
- You may leave before time is up, but you will not be allowed back in.

Names \_\_\_\_\_ Team \_\_\_\_\_ Team # \_\_\_\_\_

## Activity 1

**Recommended time: 7 minutes**

### Create a recipe

Using as many of the available allowed ingredients and tools as you need (see included list), create and write out a recipe with instructions for a delicious cupcake with frosting or icing that you and your partner could eat.

- Consider flavor preferences, allergies, and your previous experimentation.
- Be very specific. For example, “1 cup sifted all-purpose flour” is acceptable. “Some flour” is not.
- If you used or prefer a specific brand of ingredient from your personal experiments or recipes, please indicate it.
- If you are using a recipe that you have baked before, or have in your personal resource, give credit to the original author or cookbook in which it was found. Put this information in the notes section.
- Fill in the chart below including the function of the ingredients. Be specific! “Increases tenderness and makes flavor sweeter” is acceptable. “Texture” is not. Tell me what it does to the texture, flavor etc

- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>• Mixing Bowls</li><li>• Plastic Spoons, knives, and forks</li><li>• Spatulas</li><li>• Oven</li><li>• Cupcake pans</li><li>• Ziploc bags</li><li>• Kitchen Scale/gram scale</li><li>• </li><li>• White sugar</li><li>• Light Brown sugar</li><li>• 10x confectioners' sugar</li><li>• </li><li>• All-purpose flour</li><li>• Cake flour</li><li>• Rice flour (with starch for baking)</li><li>• Whole wheat flour</li><li>• Corn flour (corn meal)</li></ul> | <ul style="list-style-type: none"><li>• Cocoa powder</li><li>• </li><li>• Whole milk</li><li>• Buttermilk</li><li>• </li><li>• Baking powder</li><li>• Baking soda</li><li>• Cream of Tartar</li><li>• </li><li>• Butter</li><li>• Vegetable oil</li><li>• Egg substitute (egg beaters)</li><li>• </li><li>• Mini Chocolate chips</li><li>• Vanilla Extract</li><li>• Lemon extract</li><li>• Orange extract</li></ul> |
|---|--|

Names \_\_\_\_\_ Team \_\_\_\_\_ Team # \_\_\_\_\_

**Name of recipe:** (bonus for a good name!) \_\_\_\_\_

## Mixing Procedure

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Cooking time and temperature \_\_\_\_\_ Yield \_\_\_\_\_

Notes \_\_\_\_\_

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Names \_\_\_\_\_ Team \_\_\_\_\_ Team # \_\_\_\_\_

## **Activity 2**

**Recommended time: 5 minutes**

### **Scale down**

Now unfortunately, we do not have access to a huge oven, so we can only bake 1 cupcake per team.

Scale your recipe to make 1 cupcake and convert to SI (metric) mass measurements.

- 1) Why did you choose the kind of flour you chose?
  - 2) Why did you choose the lipid you chose?
  - 3) Why did you choose the leavening you chose?
  - 4) Did you make any specific substitutions to handle the given conditions?

Names \_\_\_\_\_ Team \_\_\_\_\_ Team # \_\_\_\_\_

## Activity 3

### Recommended time: 12 minutes Bake that recipe

In this lab, you have access to small quantities of the above listed ingredients. Label your cupcake liner with your team name and number. Record the color of cupcake liner in the space below. Using the recipe from activities 1 and 2, weigh, assemble, mix, and pour your batter into your cupcake liner. When your group is called, take the cupcake to the assigned oven and log the start time. Cupcakes will bake for 20 minutes (typical baking time for cupcakes) Mix up your icing/frosting and put it in the Ziploc bag to potentially pipe onto your cupcake later.

Cupcake liner description and label \_\_\_\_\_

- 1) If this was a real kitchen, what would be your first step?
- 2) Why did you choose the mixing method and order you did?
- 3) Did you make any changes to your recipe in response to lab conditions?

## Station A

### Activity 4: Viscosity

### 5 minutes

Time to break out your viscometer and graphs! Use the waste bucket to catch flow from your viscometer

- 1) What is the viscosity of your unknown? \_\_\_\_\_
- 2) How did you determine it?
- 3) When preparing for this event, what was the messiest or most difficult ingredient for which you determined the viscosity?
- 4) Graph Check by event volunteer \_\_\_\_\_

Names \_\_\_\_\_ Team \_\_\_\_\_ Team # \_\_\_\_\_

## Station B

### Activity 5: Qualitative Analysis

### 5 minutes

You have samples of 4 leavening agents. Baking soda, baking powder, cream of tartar, and yeast  
Use the provided reagents to positively identify each.

You should only need 2-3 drops of each reagent.

	Unknown leaven W	Unknown leaven X	Unknown Leaven Y	Unknown leaven Z
Visual observation				
Test with water				
Test with acid				
Test with iodine				
Identity				
How did you know				

## Station C

### Activity 6: Matching

### 5 minutes

Match the picture of the baked good with the production error.

Control	
No baking soda	
Oven temperature too high	
No sugar	
No flour	
Low altitude recipe cooked at high altitude	
Poor frosting mixing technique	
Trying to frost a hot cupcake	

Continued on the next page...

Names \_\_\_\_\_ Team \_\_\_\_\_ Team # \_\_\_\_\_

Match the label or recipe with the following items. Use labels and recipes lettered A-M

Skim Milk	
Buttermilk	
Butter	
Croissant Recipe	
Sugar Cookie Recipe	
Pancake Recipe	
Raised Donut Recipe	
Gluten free cake recipe	
Coconut Milk	
Baking Soda	
Baking powder	
Granulated Sugar	

Match the molecule or formula to the common name. Use molecule cards labeled N-Z.

In the third column, name an approved ingredient that contains that molecule.

Sucrose		
Glucose		
Cholesterol		
Theobromine (Hint: Contains no Bromine)		
Amylopectin		
Amylose		
Oil of wintergreen		
Lecithin		

## Station D

### Activity 7: Density

#### 5 minutes

Using the provided materials, determine the density of the liquid. Show your work, and circle your final answer. Do not open the cup! You can determine the density without opening it.

- 1) What is the formula for density? \_\_\_\_\_
- 2) What is the density of your unknown? \_\_\_\_\_
- 3) Will this liquid float or sink in water \_\_\_\_\_
- 4) Name a liquid that will float on this liquid \_\_\_\_\_
- 5) This is the same liquid for which you find viscosity. What is the difference between viscosity and density?

Names \_\_\_\_\_ Team \_\_\_\_\_ Team # \_\_\_\_\_

## Activity 8: Pop Quiz

**Recommended time: 7 minutes**

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_
- 6) \_\_\_\_\_
- 7) \_\_\_\_\_
- 8) \_\_\_\_\_
- 9) \_\_\_\_\_
- 10) \_\_\_\_\_
- 11) \_\_\_\_\_
- 12) \_\_\_\_\_
- 13) \_\_\_\_\_
- 14) \_\_\_\_\_
- 15) \_\_\_\_\_

- 16) \_\_\_\_\_
- 17) \_\_\_\_\_
- 18) \_\_\_\_\_
- 19) \_\_\_\_\_
- 20) \_\_\_\_\_
- 21) \_\_\_\_\_
- 22) \_\_\_\_\_
- 23) \_\_\_\_\_
- 24) \_\_\_\_\_
- 25) \_\_\_\_\_
- 26) \_\_\_\_\_
- 27) \_\_\_\_\_
- 28) \_\_\_\_\_
- 29) \_\_\_\_\_
- 30) \_\_\_\_\_

- 31) \_\_\_\_\_
- 32) \_\_\_\_\_
- 33) \_\_\_\_\_
- 34) \_\_\_\_\_
- 35) \_\_\_\_\_

## Activity 9: Essay/Tie Break

**Recommended time: 5 minutes**

I have been told that this event is “Materials Science you can eat”. Materials science investigates the relationship between the structure of materials at atomic or molecular level and their properties in finished products. So how does the atomic or molecular structure of flour relate to its macroscopic (large enough to see) properties? In other words, how does the molecular structure of a particular flour impact the baked goods made with it?

Names \_\_\_\_\_ Team \_\_\_\_\_ Team # \_\_\_\_\_

## **Activity 10: Cupcake Analysis, Icing or Frosting, Clean Up**

### **Recommended time: 3 minutes**

During this time frame, your cupcake should be brought to you for analysis. If you think your cupcake is ready for icing or frosting, do it. If it is not ready, put the icing or frosting in a Ziploc bag labeled with your team name and cupcake liner description. Look around you and make sure the area is tidy and ready for the next team.

- 1) Would you really eat this cupcake? \_\_\_\_\_ If not, why not?
  
- 2) What would you do differently next time?
  
- 3) What “real kitchen” tools would have made this easier? How would they have helped?
  
- 4) Just for fun, which state are you from, and what do you call the sweet topping on a cake? (Frosting, icing, glaze, ganache, something else?)

Names \_\_\_\_\_ Team \_\_\_\_\_ Team # \_\_\_\_\_

## Cupcake Score Card

### Recipe

**Ingredients** (1 pt off each for lack of flour or substitute, sweetener, leavening, lipid, flavoring)

\_\_\_\_\_ 5 points

**Purpose** \_\_\_\_\_ 5 points

**Procedures** \_\_\_\_\_ 5 points

**Yield** \_\_\_\_\_ 5 points

**Cool name bonus** \_\_\_\_\_ 5 points

### Scale Down

**Ingredients scaled correctly**

**Ingredient amount**

**divided by the reported yield**

\_\_\_\_\_ 5 pts

**All ingredients scaled into SI units**

\_\_\_\_\_ 5 pts

### Question 1

**It should reference protein content, healthy choices or allergies etc.**

**Shouldn't be recipe called for it.** \_\_\_\_\_ 5 pts

### Question 2

**Should reference tenderness, solid/liquid at room temperature, interaction with sugar for texture, allergies, vegan concerns etc.**

**Shouldn't be recipe called for it.** \_\_\_\_\_ 5 pts

### Question 3

**It should reference acid/base balance, appropriate to time constraints etc.**

**Shouldn't be recipe called for it.** \_\_\_\_\_ 5 pts

### Cupcake judging

**GBD** \_\_\_\_\_ 5pts

**Labeled properly** \_\_\_\_\_ 5pts

**Iced properly or**

**Not iced at all** \_\_\_\_\_ 5pts

**Cleaned up mess** \_\_\_\_\_ 5 pt

**Forestry – National Test – Wright State University - 2013**  
ANSWER SHEET

1.

a. **Juniperus virginiana**

b. **Thuja plicata**

c. **Aleurites moluccana**

d. \_B\_\_\_\_

e. \_E\_\_\_\_

f. \_C\_\_\_\_

g. \_D\_\_\_\_

g. \_A\_\_\_\_

h. \_B\_\_\_\_

i. \_Wind\_\_\_\_\_

4.

a. **Salix bebbiana**

b. **Maclura pomifera**

c. **Populus balsamifera**

d. \_B\_\_\_\_

2.

a. **Magnolia macrophylla**

b. **Asimina triloba**

c. **Magnolia grandiflora**

d. \_C\_\_\_\_

e. \_B\_\_\_\_

f. \_B\_\_\_\_

g. \_Red/Maroon/Red-Purple\_\_\_\_\_

h. \_D\_\_\_\_

i. \_B\_\_\_\_

e. \_B\_\_\_\_

f. \_C\_\_\_\_

g. \_Balm-of-Gilead\_\_\_\_\_

h. \_B\_\_\_\_

5.

a. **Gymnocladus dioicus**

b. **Robinia pseudoacacia**

c. **Ilex vomitoria**

d. \_1\_\_\_\_

e. \_2\_\_\_\_

3.

a. **Quercus kelloggii**

f. \_E\_\_\_\_

g. \_G\_\_\_\_

b. **Quercus rubra**

h. \_B\_\_\_\_

c. **Quercus macrocarpus**

i. \_C\_\_\_\_

d. \_C\_\_\_\_

e. \_A\_\_\_\_

f. \_B\_\_\_\_

# Forestry – National Test – Wright State University - 2013

## ANSWER SHEET

6. f. \_\_\_ named after Archibald Menzies, a Scottish physician who first documented the tree \_\_\_\_\_
- a. Fraxinus americana
- b. Quercus muehlenbergii
- c. Ulmus americana
- d. \_E\_\_\_
- e. \_G\_\_\_
- f. \_C\_\_\_
- g. \_G\_\_\_
9. a. Taxodium distichum
- b. Larix laricina
- c. Abies concolor
- d. \_D\_\_\_
- e. \_G\_\_\_
- f. \_\_\_Stomata\_\_\_\_\_
- g. \_\_\_Swamps\_\_\_\_\_
7. a. Pinus aristata
- b. Pinus lambertiana
- c. Pinus contorta
- d. \_B\_\_\_
- e. \_A\_\_\_
- f. \_B\_\_\_
- g. \_C\_\_\_
- h. \_A\_\_\_
- i. \_\_\_Resin\_\_\_\_\_
10. a. Pinus ponderosa
- b. Pinus strobus
- c. monoecious
- d. \_\_\_Both male and female parts grow on the same individual plant\_\_\_\_\_
- e. \_\_\_Lower\_\_\_\_\_
- f. \_\_\_Male structures are lower so they do not self-pollinate the female structures\_\_\_\_\_
- d. \_\_\_bright red color from damaged or scraped bark\_\_\_\_\_
- g. \_E\_\_\_
- e. \_A\_\_\_

# Forestry – National Test – Wright State University - 2013

## ANSWER SHEET

11. f. \_A\_\_
- a. *Cornus nuttallii* g. \_Cyanide/hydrogen cyanide/
- b. *Arbutus menziesii* cyanogenic glycosides\_\_\_\_\_
- c. *Morus rubra* h. \_asexual reproduction without
- d. \_bract\_\_\_\_\_ fertilization\_\_\_\_\_
- e. \_to attract pollinators\_\_\_\_\_ 14.
- f. \_D\_\_ a. *Acer negundo*
- g. \_The fruit produces a hooked barb b. *Celtis occidentalis*
- that can latch on to animals\_\_\_\_\_ c. *Populus tremuloides*
- h. \_Decreased [fires reduce conifer d. \_White\_\_\_\_\_
- overstory and helps sprout seeds]\_\_\_\_\_ e. \_D\_\_
12. f. \_F\_\_
- a. *Quercus virginiana* g. \_G\_\_
- b. *Sassafras albidum* 15.
- c. *Umbellularia californica* a. *Nyssa sylvatica*
- d. \_E\_\_ b. *Quercus chrysolepis*
- e. \_F\_\_ c. *Quercus imbricaria*
- f. \_A\_\_ d. \_B\_\_
- g. \_A\_\_ e. \_F\_\_
13. f. \_B\_\_
- a. *Carya illinoensis* g. \_A\_\_
- b. *Prunus serotina*
- c. *Amelanchier alnifolia*
- d. \_A\_\_
- e. \_D\_\_

**Forestry – National Test – Wright State University - 2013**  
**ANSWER SHEET**

16.

- a. **Betula populifolia**
- b. **Populus fremontii**
- c. **Juglans cinerea**
- d. \_G\_\_\_\_
- e. \_A\_\_\_\_
- f. \_D\_\_\_\_
- g. \_A\_\_\_\_

17.

- a. **Ilex opaca**
- b. **Eucalyptus globulus**
- c. **Heteromeles arbutifolia**
- d. \_G\_\_\_\_
- e. \_B\_\_\_\_
- f. \_A\_\_\_\_
- g. \_E\_\_\_\_

18.

- a. **Abies balsamea**
- b. **Tsuga Canadensis**
- c. **Abies lasiocarpa**
- d. \_G\_\_\_\_
- e. \_H\_\_\_\_
- f. \_B\_\_\_\_
- g. \_Sheds its needles soon after being cut down\_\_\_\_\_

19.

- a. **Aesculus glabra**
- b. **Crataegus douglasii**
- c. **Pinus flexilis**
- d. \_Asia\_\_\_\_\_
- e. \_Branches are flexible and can be bent, looped, or tied in knots without breaking\_\_\_\_\_
- f. \_C\_\_\_\_
- g. \_A\_\_\_\_

20.

- a. **Picea mariana**
- b. **Pinus palustris**
- c. **Picea glauca**
- d. \_B\_\_\_\_
- e. \_A\_\_\_\_
- f. \_C\_\_\_\_
- g. \_A\_\_\_\_

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**1.**

Please identify Samples A, B and C (Scientific name). Hint: Samples A and B reside in opposite parts of North America, and Sample A naturally ranges across half of the United States.

**1a.** Sample A:

**1b.** Sample B:

**1c.** Sample C:

**1d.** The fruit from Sample A has been used as:

- a. Natural yellow dyes
- b. Flavoring for alcoholic beverages
- c. Flashes for early photography
- d. Host sites for beneficial wasps
- e. Dental cleansing agents
- f. Arrow poisons

**1e.** Crushing the leaves of Sample B produces a smell that most closely resembles:

- a. Skunk
- b. Licorice
- c. Wet hay
- d. Peanut butter
- e. Pineapple
- f. Wintergreen

**1f.** Sample A affects other plants around it by changing the chemistry of the soil through both its roots and its fallen leaves. What soil changes would this plant most likely cause?

- a. Increased soil nitrogen, Increased pH
- b. Increased soil nitrogen, Decreased pH
- c. Decreased soil nitrogen, Increased pH
- d. Decreased soil nitrogen, Decreased pH

**1g.** The fruit from Sample C would most likely be:

- a. used as a flavoring agent for stews
- b. used as a fish poison
- c. used to prevent heart disease
- d. used as a fuel for burning
- e. used to ward off spiders and scorpions
- f. used as feed for livestock

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**2.**

**2a.** Please identify Sample A (scientific name):

**2b.** Please identify Sample B (scientific name):

**2c.** Please identify Sample C (scientific name):

**2d.** This fruit belongs to which sample?

- a. Sample A
- b. Sample B
- c. Sample C

**2e.** This fruit belongs to which sample?

- a. Sample A
- b. Sample B
- c. Sample C

**2f.** The zebra swallowtail butterfly would most prefer to feed on which of these plants?

- a. Sample A
- b. Sample B
- c. Sample C

**2g.** What color are the mature flowers of Sample B?

**2h.** Which of these samples are considered understory trees?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and Sample B
- e. Sample A and Sample C
- f. Sample B and Sample C
- g. Samples A, B and C

**2i.** Which two samples are most closely related?

- a. Sample A and Sample B
- b. Sample A and Sample C
- c. Sample B and Sample C

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**3.**

Identify Samples A, B, and C (scientific name)

**3a.** Sample A:

**3b.** Sample B:

**3c.** Sample C:

**3d.** Which tree bears the largest fruit?

- a. Sample A
- b. Sample B
- c. Sample C

**3e.** Which tree has the most limited natural distribution?

- a. Sample A
- b. Sample B
- c. Sample C

**3f.** Which tree is the MOST important for timber in North America?

- a. Sample A
- b. Sample B
- c. Sample C

**3g.** Which tree is most likely to grow in a coniferous forest?

- a. Sample A
- b. Sample B
- c. Sample C

**3h.** Which tree can be identified by long, smooth ridges that run up and down its bark?

- a. Sample A
- b. Sample B
- c. Sample C

**3i.** How are all three of these trees most likely to be pollinated?

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**4.**

Please identify samples A, B, and C (Scientific name)

**4a.** Sample A:

**4b.** Sample B:

**4c.** Sample C:

**4d.** Which two samples are most closely related to each other?

- a. Samples A and B
- b. Samples A and C
- c. Samples B and C

**4e.** Which tree may have been distributed by the feedings of the now-extinct giant ground sloth?

- a. Sample A
- b. Sample B
- c. Sample C

**4f.** Which of these trees commonly forms a hybrid with *Populus deltoides* where their ranges overlap?

- a. Sample A
- b. Sample B
- c. Sample C

**4g.** Please give the common name of the hybrid formed in the above question (4f):

**4h.** Which of these trees produces a fruit that is botanically referred to as a syncarp?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample A, B, and C
- g. none of the above

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**5.**

Please identify samples A, B, and C (scientific name). Sample A is in two pieces, and can be pieced together at the “x”.

**5a.** Sample A:

**5b.** Sample B:

**5c.** Sample C:

**5d.** How many leaves are in Sample A?

**5e.** How many leaves are in Sample B?

**5f.** Sample A produces a dangerous toxin that is most similar to:

- a. cyanide
- b. caffeine
- c. tannic acid
- d. strychnine
- e. nicotine
- f. atropine
- g. ricin

**5g.** Sample B produces a dangerous toxin that is most similar to:

- a. cyanide
- b. caffeine
- c. tannic acid
- d. strychnine
- e. nicotine
- f. atropine
- g. ricin

**5h.** Sample C produces a dangerous toxin that is most similar to:

- a. cyanide
- b. caffeine
- c. tannic acid
- d. strychnine
- e. nicotine
- f. atropine
- g. ricin

**5i.** *Yerba mate* is a drink that is produced from a close relative of which tree?

- a. Sample A
- b. Sample B
- c. Sample C

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**6.**

Please identify Samples A, B and C (scientific name). Note, Sample A was collected from a very young tree.

**6a.** Sample A:

**6b.** Sample B:

**6c.** Sample C:

**6d.** Which of these samples has seen much of its North American population decimated at least in part by a type of beetle?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample A, B, and C
- g. none of the above

**6e.** Which of these samples has seen much of its North American population decimated at least in part by a type of virus?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample A, B, and C
- g. none of the above

**6f.** Which of these samples has seen much of its North American population decimated at least in part by a type of fungus?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample A, B, and C
- g. none of the above

**6g.** Which of these samples produces fruit popularly eaten by people?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample A, B, and C
- g. none of the above

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**7.**

These are each considered western species. Please identify Sample A, B and C (scientific name).

- 7a.** Sample A:  
**7b.** Sample B:  
**7c.** Sample C:

**7d.** Which of these trees generally grows the tallest?

- a. Sample A  
b. Sample B  
c. Sample C

**7e.** Which of these trees generally grows the oldest?

- a. Sample A  
b. Sample B  
c. Sample C

**7f.** Which tree does this fruit belong to?

- a. Sample A  
b. Sample B  
c. Sample C

**7g.** Which tree often relies on fire to replace old individuals with young ones?

- a. Sample A  
b. Sample B  
c. Sample C  
d. Sample A and B  
e. Sample A and C  
f. Sample A, B, and C

**7h.** Which tree can be found growing at the highest altitudes?

- a. Sample A  
b. Sample B  
c. Sample C

**7i.** What are the white spots on the leaves on Sample A composed of?

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**8.**

Please identify samples A, B and C by scientific name.

**8a.** Sample A:

**8b.** Sample B:

**8c.** Sample C:

**8d.** What does the specific epithet of Sample A refer to? In other words, how did Sample A get the second word in its scientific name?

**8e.** Which samples would most likely grow next to each other in their native habitats?

- a. Samples A and B
- b. Samples A and C
- c. Samples B and C
- d. They all grow next to each other in their native habitats
- e. While their ranges may overlap, none of these trees grows in the same habitat

**8f.** What does the specific epithet in Sample B refer to? In other words, how did Sample B get the second word of its scientific name?

**8g.** What threatened bird is closely associated with Sample B, becoming a famous symbol to prevent unsustainable logging and deforestation?

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**9.**

Please identify Sample A, B and C (scientific name).

**9a.** Sample A:

**9b.** Sample B:

**9c.** Sample C:

**9d.** Which of these trees is deciduous?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample A, B, and C
- g. None of the above

**9e.** Which of these trees is an angiosperm?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample A, B, and C
- g. None of the above

**9f.** What are the microscopic structures that would create the blue-white bands underneath the leaves of Sample C? Please give a specific name.

**9g.** Trees that have the “knees” exhibited by Sample A usually grow in what type of habitat?

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**10.**

Sample A and Sample B have similar quality wood. Sample A is a western species and Sample B is an eastern species. Please identify each species (Scientific name)

**10a.** Sample A:

**10b.** Sample B:

**10c.** Are the samples above considered monoecious or dioecious?

**10d.** What does the word from the correct answer above (10c) mean?

**10e.** Do the male structures of Sample A and Sample B usually grow on the upper parts of the tree or the lower parts of the tree?

**10f.** Please explain the reasoning for the answer above (10e).

**10g.** For the genus represented by Sample A, how long does it usually take for a mature seed to develop after the pollen enters the female cone?

- a. about 2 hours
- b. about 2 days
- c. about 2 weeks
- d. about 2 months
- e. about 2 years
- f. about 2 decades

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**11.**

Please identify samples A, B, and C (scientific name)

**11a.** Sample A:

**11b.** Sample B:

**11c.** Sample C (hint, the upper surface is hairy and rough):

**11d.** What is the highlighted structure on Sample A called?

**11e.** What is the function of the highlighted structure above?

**11f.** Which of these samples produce fruit botanically described as “berries”?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**11g.** When the fruit from Sample B dries up, it can still be distributed by animals even though it is uneaten. How does this usually happen?

**11h.** How has the prevention of fire affected the numbers of Sample B in the wild?

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**12.**

Please identify Samples A, B and C (Scientific name).

**12a.** Sample A:

**12b.** Sample B:

**12c.** Sample C:

**12d.** Which of these samples are evergreen?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**12e.** Which of these trees may be used to flavor food that people eat?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**12f.** Which tree was used to build the frame of the famous naval ship *USS Constitution*, or “Old Ironsides”?

- a. Sample A
- b. Sample B
- c. Sample C

**12g.** Which of these trees has some overlap in their native distributions?

- a. Sample A and B
- b. Sample A and C
- c. Sample B and C
- d. Sample A, B, and C
- e. none of the above

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**13.**

Please identify Sample A, B and C (scientific name).

**13a.** Sample A:

**13b.** Sample B:

**13c.** Sample C:

**13d.** Which Samples have the same type of fruit (botanically classified)?

- a. Sample A and B
- b. Sample A and C
- c. Sample B and C
- d. Sample A, B, and C
- e. none of the samples shares a fruit with the same botanical classification

**13e.** Which samples have ALTERNATELY branching leaves?

- a. Sample A and B
- b. Sample A and C
- c. Sample B and C
- d. Sample A, B, and C
- e. none of the samples shares a fruit with the same botanical classification

**13f.** Which sample's fruit provides the highest fat content?

- a. Sample A
- b. Sample B
- c. Sample C

**13g.** Breaking open the leaf or twig of Sample B may produce an almond-like smell. What chemical causes that smell?

**13h.** Sample C may display a phenomenon known as "apomixis". What is "apomixis"?

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**14.**

Please identify the samples by scientific name.

**14a.** Sample A:

**14b.** Sample B:

**14c.** Sample C:

**14d.** The common name for Sample A is connected to the color of its wood. What color wood does its common name refer to?

**14e.** Which sample(s) are often used as street trees due because of fast growth and disease resilience?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Samples A and B
- e. Samples A and C
- f. Samples B and C
- g. Samples A, B and C

**14f.** Which are primary mineral macronutrients needed by plants?

- a. Nitrogen
- b. Oxygen
- c. Potassium
- d. Phosphorous
- e. Nitrogen and Oxygen
- f. Nitrogen, Potassium and Phosphorous
- g. Oxygen, Potassium and Phosphorous
- h. Nitrogen, Oxygen, Potassium and Phosphorous

**14g.** Which are secondary mineral macronutrients needed by plants?

- a. Carbon
- b. Sulfur
- c. Magnesium
- d. Calcium
- e. Carbon and Magnesium
- f. Carbon, Sulfur and Magnesium
- g. Sulfur, Magnesium and Calcium
- h. Carbon, Sulfur, Magnesium and Calcium

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**15.**

Please identify Sample A, B and C (scientific name)

**15a.** Sample A:

**15b.** Sample B:

**15c.** Sample C:

**15d.** Which species grows well in very rocky environments?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C

**15e.** Which of these species produces fruits botanically characterized as nuts?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C

**15f.** Which species has the most variability in possible leaf shapes (in general, not just what you see in the test samples)?

- a. Sample A
- b. Sample B
- c. Sample C

**15g.** At the same latitude, which species would generally have its leaves changing into fall colors first?

- a. Sample A
- b. Sample B
- c. Sample C

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**16.**

Please identify Samples A, B and C (scientific name). Hint: The natural range for Sample B does not overlap with Sample A or Sample C.

**16a.** Sample A:

**16b.** Sample B:

**16c.** Sample C:

**16d.** Which species produces catkins?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**16e.** Which structures are usually larger (if they appear in the same species): male catkins or female catkins?

- a. Male catkins
- b. Female catkins
- c. Male and Female catkins are usually around the same size
- d. Neither: catkins always comprise both male and female parts

**16f.** Which tree produces fruit that are distributed by wind?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**16g.** Which tree can be distinguished by its reddish bark when young?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**17.**

Please identify Sample A, B and C (scientific name):

**17a.** Sample A:

**17b.** Sample B:

**17c.** Sample C:

**17d.** Which of these species is evergreen?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**17e.** Which of these species is considered an invasive species in America?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**17f.** Which of these species naturally finds its habitat in the forest understory?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**17g.** Which of these species produces red fruit?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**18.**

Please identify Samples A, B and C by scientific name. Hint: Samples A and B overlap in their natural range, but they do not overlap with Sample C.

**18a.** Sample A:

**18b.** Sample B:

**18c.** Sample C:

**18d.** Which of these species can provide pulpwood for making paper?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**18e.** Which of these species is a good option for strong timber to make furniture?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

**18f.** Which of these species is the LEAST desirable for use as a Christmas tree?

- a. Sample A
- b. Sample B
- c. Sample C

**18g.** Please explain why the species above (18f.) is not a popular choice for use as Christmas trees.

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**19.**

Please identify Sample A, B and C by scientific name.

**19a.** Sample A:

**19b.** Sample B:

**19c.** Sample C:

**19d.** Which continent has the most diversity of conifer species?

**19e.** How did sample C get its common name?

**19f.** Sample C is often affected by a disease known as blister rust. Which other trees on the list are also affected by a blister rust?

- a. Red Pine, Jack Pine, Shortleaf Pine
- b. Pitch Pine, Virginia Pine, Longleaf Pine
- c. Eastern White Pine, Western White Pine, Sugar Pine
- d. Pinyon, Bristlecone Pine, Knobcone Pine

**19g.** Which samples share similar habitats?

- a. Samples A and B
- b. Samples B and C
- c. Samples A and C
- d. Samples A, B and C

**Forestry – National Test – Wright State University - 2013**  
**TEST**

**20.**

Please identify Sample A, B and C by scientific name.

**20a.** Sample A:

**20b.** Sample B:

**20c.** Sample C:

**20d.** You would be most likely to naturally find Sample C in which biome?

- a. temperate forest
- b. taiga
- c. desert
- d. plains
- e. tundra
- f. rainforest
- g. semi-arid highland

**20e.** Which of these species generally grows the shortest (in height)?

- a. Sample A
- b. Sample B
- c. Sample C

**20f.** Which of these species is the most important commercial tree species in Canada?

- a. Sample A
- b. Sample B
- c. Sample C

**20g.** Which of these species is often found growing in poorly drained soils?

- a. Sample A
- b. Sample B
- c. Sample C
- d. Sample A and B
- e. Sample A and C
- f. Sample B and C
- g. Sample A, B, and C
- h. none of the above

2013 NSO  
FORESTRY ANSWER SHEET

**1**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**3**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

h\_\_\_\_\_

i\_\_\_\_\_

**2**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

h\_\_\_\_\_

i\_\_\_\_\_

**4**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

h\_\_\_\_\_

2013 NSO  
FORESTRY ANSWER SHEET

**5**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

h\_\_\_\_\_

i\_\_\_\_\_

**7**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

h\_\_\_\_\_

i\_\_\_\_\_

**6**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**8**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

2013 NSO  
FORESTRY ANSWER SHEET

**9**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**4**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

h\_\_\_\_\_

**10**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

h\_\_\_\_\_

i\_\_\_\_\_

**12**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

2013 NSO  
FORESTRY ANSWER SHEET

**13**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**15**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**14**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**16**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

2013 NSO  
FORESTRY ANSWER SHEET

**17**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**19**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**18**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**20**

a\_\_\_\_\_

b\_\_\_\_\_

c\_\_\_\_\_

d\_\_\_\_\_

e\_\_\_\_\_

f\_\_\_\_\_

g\_\_\_\_\_

**National Science Olympiad 2013**  
**Helicopters B**

Enter # of Teams in Cell D1 -->		60	1. Flight 1: All Const. & Comp. OK		2. Flight 2: All Const. & Comp. OK		3. Flight Log Status		4. Participation Points Only			Flight 1 Time			Flight 2 Time		
Team Number	Team Name (Enter below)	State	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
	Please fill in "Y" or "N" in column E, F, H, and I. The default value in columns E and F are "Y." The default value in columns H and I are "N."																
1	Winston Churchill	CA	y	y	Complete			4.78	4.91	4.78		86.46	86.65				
2	Muscatal Middle School	CA	y	y	Complete			116.03	116.16	116.09	105.72	105.53	105.16				
3	Fred J. Carnage Middle Schoo	NC	y	y	Complete			68.91	69.00	69.10	49.93	49.87					
4	Piedmont Middle School	NC	y	y	Complete			100.24	100.38	100.60	110.03	109.94	110.00				
5	Meads Mill Middle School	MI	y	y	Complete			135.12	134.97		151.31	151.19	151.31				
6	Grand Haven Lakeshore	MI	y	y	Complete			89.85	89.65	90.25	7.50	7.39	7.57				
7	Paul J Gelinas	NY	y	y	Complete			127.50	127.66	127.66	130.43	130.44	130.44				
8	Eagle Hill	NY	y	y	Complete			86.13	86.47	86.19	80.19	80.09	80.19				
9	Daniel Wright	IL	y	y	Complete			118.75	118.60	118.78	117.19	117.47	117.44				
10	Marie Murphy	IL	y	y	Complete			178.75	178.84	178.69	185.44	185.44	185.56				
11	Shady Side Academy	PA	y	y	Complete			114.81	114.69	114.66							
12	Strath Haven	PA	y	y	Complete			125.16	125.15	125.18							
13	Solon Middle School	OH	y	y	Complete			179.28	179.37	179.47	159.66	159.69	159.72				
14	Mentor Middle School	OH	y	y	Complete			149.00	149.28	148.88	162.84	162.85	163.06				
15	Beckendorff Junior High Schoo	TX	y	y	Complete			3.56	3.65	3.65	43.53	43.50	43.53				
16	Riverwood MS	TX	y	y	Complete			85.37	85.47	85.71	152.44	152.44	152.69				
17	J.C. Booth	GA	y	y	Complete			149.12	149.15	149.13	155.62	155.53	155.56				
18	Dodgen Middle School	GA	y	y	Complete			109.28	109.56	109.57	121.12	121.38	121.40				
19	Ladue	MO	y	y	Complete			104.44	104.50	104.66	109.18	109.22	109.19				
20	Pembroke Hill	MO	y	y	Complete			92.53	92.41	92.57	75.41	74.75	74.91				
21	Orlando Science Schools	FL	y	y	Complete			35.56	35.44	35.63							
22	Trinity Preparatory School	FL	y	y	Complete			87.59	87.81	88.12	88.88						
23	Thomas Jefferson	IN	y	y	Complete			105.66	105.72	105.75	78.00	78.19	77.97				
24	Stanley Clark School	IN	y	y	Complete			46.97	46.84	47.00	54.97	55.13	55.13				
25	Preston Middle School	CO	y	y	Complete			84.03	84.19	83.85	77.75	77.50	77.66				
26	Homeschool of Colorado	CO	y	y	Complete			128.43	128.32	128.65	101.91	101.94	101.97				
27	Auburn Junior High School	AL	y	y	Complete			108.59	108.50	108.56	123.47	123.21	123.31				
28	Canyon Park Junior High	WA	y	y	Complete			87.81	88.00	87.47							
29	Leawood Middle School	KS	y	y	Complete			7.66	7.56	7.43	7.19	7.13	6.91				
30	Wachter Middle School	ND	y	y	Complete			59.91	59.81	59.91	59.00	59.06	59.09				
31	Albuquerque Area Homeschoo	NM	y	y	Complete			14.91	14.66	15.22	1.56		1.41				
32	Hamilton Middle School	WI	y	y	Complete			4.19	4.34	4.19	59.88	60.00	59.88				
33	Henry B duPont Middle School	DE	y	y	Complete			71.78	71.88	71.72	92.88	93.00	93.09				
34	Longfellow Middle School	VA	y	y	Complete			48.63	48.71	48.63	48.78	48.93	48.84				
35	Community Middle School	NJ	y	y	Complete			127.60	127.62	127.90	110.19	110.19	110.19				
36	Bearden Middle School	TN	y	y	Complete			103.69	103.84	103.91	77.16	77.06	76.93				
37	Russell Middle School	KY	y	y	Complete			124.94	125.16	125.12							
38	Corvallis Middle School	MT	y	y	Complete			98.06	97.84	98.00	84.63	85.00	84.94				
39	Mission Middle School	NE	y	y	Complete				92.97	93.15	115.84	115.81	115.81				
40	North Bethesda Middle School	MD	y	y	Complete			72.00	71.84	72.07	76.59	76.59	76.63				

Direct all questions to

**National Science Olympiad 2013**  
**Helicopters B**

Enter # of Teams in Cell D1 -->		60	Scoring and Ranking							Final Score			
Team Number	Team Name (Enter below)	State	Flight 1			Flight 2			Score	Tier	Tiebreaker	Rank	Points
			Run 1 Tier	Run 1 Time	Run 1 log adjusted score	Run 2 Tier	Run 2 Time	Run 2 log adjusted score					
	Please fill in "Y" or "N" in column E, F, H, and I. The default value in columns E and F are "Y." The default value in columns H and I are "N."												
1	Winston Churchill	CA	1	4.78	4.78	<-	1	86.56	86.56	86.56	1	0	36
2	Muscatal Middle School	CA	1	116.09	116.09	<-	1	105.53	105.53	116.09	1	0	17
3	Fred J. Carnage Middle Schoo	NC	1	69.00	69.00	<-	1	49.90	49.90	69.00	1	0	42
4	Piedmont Middle School	NC	1	100.38	100.38	>-	1	110.00	110.00	110.00	1	0	21
5	Meads Mill Middle School	MI	1	135.05	135.05	>-	1	151.31	151.31	151.31	1	0	6
6	Grand Haven Lakeshore	MI	1	89.85	89.85	<-	1	7.50	7.50	89.85	1	0	32
7	Paul J Gelinas	NY	1	127.66	127.66	>-	1	130.44	130.44	130.44	1	0	8
8	Eagle Hill	NY	1	86.19	86.19	<-	1	80.19	80.19	86.19	1	0	37
9	Daniel Wright	IL	1	118.75	118.75	<-	1	117.44	117.44	118.75	1	0	16
10	Marie Murphy	IL	1	178.75	178.75	>-	1	185.44	185.44	185.44	1	0	1
11	Shady Side Academy	PA	1	114.69	114.69	<-	P	P	P	114.69	1	0	19
12	Strath Haven	PA	1	125.16	125.16	<-	P	P	P	125.16	1	0	12
13	Solon Middle School	OH	1	179.37	179.37	<-	1	159.69	159.69	179.37	1	0	2
14	Mentor Middle School	OH	1	149.00	149.00	>-	1	162.85	162.85	162.85	1	0	3
15	Beckendorff Junior High Schoo	TX	1	3.65	3.65	>-	1	43.53	43.53	43.53	1	0	51
16	Riverwood MS	TX	1	85.47	85.47	>-	1	152.44	152.44	152.44	1	0	5
17	J.C. Booth	GA	1	149.13	149.13	>-	1	155.56	155.56	155.56	1	0	4
18	Dodgen Middle School	GA	1	109.56	109.56	>-	1	121.38	121.38	121.38	1	0	15
19	Ladue	MO	1	104.50	104.50	>-	1	109.19	109.19	109.19	1	0	22
20	Pembroke Hill	MO	1	92.53	92.53	<-	1	74.91	74.91	92.53	1	0	30
21	Orlando Science Schools	FL	1	35.56	35.56	<-	P	P	P	35.56	1	0	53
22	Trinity Preparatory School	FL	1	87.81	87.81	>-	1	88.88	88.88	88.88	1	0	33
23	Thomas Jefferson	IN	1	105.72	105.72	<-	1	78.00	78.00	105.72	1	0	23
24	Stanley Clark School	IN	1	46.97	46.97	>-	1	55.13	55.13	55.13	1	0	48
25	Preston Middle School	CO	1	84.03	84.03	<-	1	77.66	77.66	84.03	1	0	38
26	Homeschool of Colorado	CO	1	128.43	128.43	<-	1	101.94	101.94	128.43	1	0	10
27	Auburn Junior High School	AL	1	108.56	108.56	>-	1	123.31	123.31	123.31	1	0	14
28	Canyon Park Junior High	WA	1	87.81	87.81	<-	P	P	P	87.81	1	0	34
29	Leawood Middle School	KS	1	7.56	7.56	<-	1	7.13	7.13	7.56	1	0	56
30	Wachter Middle School	ND	1	59.91	59.91	<-	1	59.06	59.06	59.91	1	0	46
31	Albuquerque Area Homeschoo	NM	1	14.91	14.91	<-	1	1.49	1.49	14.91	1	0	55
32	Hamilton Middle School	WI	1	4.19	4.19	>-	1	59.88	59.88	59.88	1	0	47
33	Henry B duPont Middle School	DE	1	71.78	71.78	>-	1	93.00	93.00	93.00	1	0	29
34	Longfellow Middle School	VA	1	48.63	48.63	>-	1	48.84	48.84	48.84	1	0	50
35	Community Middle School	NJ	1	127.62	127.62	<-	1	110.19	110.19	127.62	1	0	11
36	Bearden Middle School	TN	1	103.84	103.84	<-	1	77.06	77.06	103.84	1	0	24
37	Russell Middle School	KY	1	125.12	125.12	<-	P	P	P	125.12	1	0	13
38	Corvallis Middle School	MT	1	98.00	98.00	<-	1	84.94	84.94	98.00	1	0	27
39	Mission Middle School	NE	1	93.06	93.06	>-	1	115.81	115.81	115.81	1	0	18
40	North Bethesda Middle School	MD	1	72.00	72.00	>-	1	76.59	76.59	76.59	1	0	41

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**Helicopters B**

Enter # of Teams in Cell D1 -->		60					Flight 1 Time			Flight 2 Time		
Team Number	Team Name (Enter below)	State	1. Flight 1: All Const. & Comp. OK		2. Flight 2: All Const. & Comp. OK		3. Flight Log Status		4. Participation Points Only		5. Disqualified (DQ)	
			6. Timer 1 (in sec)	7. Timer 2 (in sec)	8. Timer 3 (in sec)	9. Timer 1 (in sec)	10. Timer 2 (in sec)	11. Timer 3 (in sec)				
41	Coolidge Middle School	MA	y	y	Complete		46.15	46.28	46.22	68.78	68.69	68.75
42	Fairfield	UT	y	y	Complete		114.43	114.41	114.32	113.06	113.03	113.00
43	Paragon Science Academy	AZ	y	y	Complete		77.56	77.97	77.81	0.50	1.69	1.37
44	Highlands Intermediate	HI	y	y	Complete		1.88	2.13	1.32	1.15	1.25	0.97
45	Friedell	MN	y	y	Complete		43.28	43.66	42.93	16.44	16.53	
46	Germantown Middle School	MS	y	y	Incomplete		15.63	16.00	15.53	20.31	20.28	20.53
47	St. Joseph's Catholic School	ID	y	y	Complete		91.82	92.19	91.90	20.26	20.00	20.19
48	Lyme-Old Lyme Middle School	CT	y	y	Complete		86.28	86.38	86.44	97.16	97.21	97.22
49	St John Bedmans	LA	y	y	Complete		81.19	81.28	81.56	86.97	87.13	87.22
50	Our Lady of Mercy	RI	y	y	Complete		52.69	52.16	52.63	63.94	64.09	64.12
51	Teeland Middle School	AK	y	y	Complete		99.47	99.44	99.72	74.50	74.28	74.34
52	Bell Street Middle School	SC	y	y	Complete		83.03	82.72	83.09	1.25	0.95	
53	Catlin Gabel	OR	y	y	Complete		128.81	128.72	128.97	110.12	110.78	110.31
54	LISA Academy West	AR	n	n	Complete		1.44	1.29		0.97	0.78	
55	Hyde Park	NV	y	y	Complete		2.90	2.72	3.35	5.53	5.53	5.53
56	Casady School	OK	y	y	Complete		98.10	98.28	97.90	83.93	83.93	84.12
57	Riverton	WY										
58	Mt. Vernon	IA	y	y	Complete		50.50	50.41	50.50	51.78	51.79	51.88
59	Yankton	SD	y	y	Complete		128.69	128.62	128.60	135.31	135.22	134.58
60	Medomak Middle School	ME	y	y	Complete		58.84	58.87	58.72	62.40	62.59	62.53
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**Helicopters B**

Enter # of Teams in Cell D1 -->		60	Scoring and Ranking							Final Score			
Team Number	Team Name (Enter below)	State	Flight 1			Flight 2			Score	Tier	Tiebreaker	Rank	Points
			Run 1 Tier	Run 1 Time	Run 1 log adjusted score	Run 2 Tier	Run 2 Time	Run 2 log adjusted score					
41	Coolidge Middle School	MA	1	46.22	46.22	->	1	68.75	68.75	68.75	1	0	43
42	Fairfield	UT	1	114.41	114.41	<-	1	113.03	113.03	114.41	1	0	20
43	Paragon Science Academy	AZ	1	77.81	77.81	<-	1	1.37	1.37	77.81	1	0	40
44	Highlands Intermediate	HI	1	1.88	1.88	<-	1	1.15	1.15	1.88	1	0	58
45	Friedell	MN	1	43.28	43.28	<-	1	16.49	16.49	43.28	1	0	52
46	Germantown Middle School	MS	1	15.63	14.07	->	1	20.31	18.28	18.28	1	0	54
47	St. Joseph's Catholic School	ID	1	91.90	91.90	<-	1	20.19	20.19	91.90	1	0	31
48	Lyme-Old Lyme Middle School	CT	1	86.38	86.38	->	1	97.21	97.21	97.21	1	0	28
49	St John Bedmans	LA	1	81.28	81.28	->	1	87.13	87.13	87.13	1	0	35
50	Our Lady of Mercy	RI	1	52.63	52.63	->	1	64.09	64.09	64.09	1	0	44
51	Teeland Middle School	AK	1	99.47	99.47	<-	1	74.34	74.34	99.47	1	0	25
52	Bell Street Middle School	SC	1	83.03	83.03	<-	1	1.10	1.10	83.03	1	0	39
53	Catlin Gabel	OR	1	128.81	128.81	<-	1	110.31	110.31	128.81	1	0	9
54	LISA Academy West	AR	2	1.37	1.37	<-	2	0.88	0.88	1.37	2	0	59
55	Hyde Park	NV	1	2.90	2.90	->	1	5.53	5.53	5.53	1	0	57
56	Casady School	OK	1	98.10	98.10	<-	1	83.93	83.93	98.10	1	0	26
57	Riverton	WY	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	61
58	Mt. Vernon	IA	1	50.50	50.50	->	1	51.79	51.79	51.79	1	0	49
59	Yankton	SD	1	128.62	128.62	->	1	135.22	135.22	135.22	1	0	7
60	Medomak Middle School	ME	1	58.84	58.84	->	1	62.53	62.53	62.53	1	0	45
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**Helicopters B**

Enter # of Teams in Cell D1 -->		60	1. Flight 1: All Const. & Comp. OK	2. Flight 2: All Const. & Comp. OK	3. Flight Log Status	4. Participation Points Only	5. Disqualified (DQ)	Flight 1 Time	Flight 2 Time
Team Number	Team Name (Enter below)	State							
81									
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85									
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**National Science Olympiad 2013**  
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Enter # of Teams in Cell D1 -->		60	Scoring and Ranking					Final Score			
Team Number	Team Name (Enter below)	State	Flight 1		Flight 2		Score	Tier	Tiebreaker	Rank	Points
			Run 1 Tier	Run 1 Time	Run 1 log adjusted score	Better Flight					
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